Space Weather Forecast

Issued on Monday, 22 January 2024 at 13:20 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Notable Earth-directed CME. Moderate Geomagnetic Storm G2 Likely, Chance G3 22-23 Jan. Further Moderate-class flares (R1-R2 radio blackouts) likely, with a slight chance of Strong-class flares (R3 or greater radio blackouts).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was Moderate over the last 24 hours, with a low-level Moderate flare observed at 22/0622UTC from the large and moderately complex sunspot region in the northeast. Also of note is a developing region in the southwest, which has seen an increase in spots and complexity recently. The six other named regions on the disc are less complex and more stable.

At 21/0015UTC a filament (arc of the Sun's plasma) was seen erupting from the northeast disc, immediately southeast of the largest sunspot region, resulting in a coronal mass ejection (CME). This feature has been modelled and determined most likely to pass behind the track of the Earth in its orbit to no effect, but there is a chance of a glancing blow late on Day 2 (23 Jan). During the evening of 21 Jan some unusual activity was noted in coronagraph imagery in the southeastern disc. A slow CME is evident, directed mainly to the south, with further analysis ongoing to determine if there is an Earth-directed component, although this appears unlikely. A filament lift-off at 22/1000UTC from south-central disc was observed, but preliminary analysis suggests this is unlikely to have a significant Earth-directed component. Other activity in the period was mainly identified with the off-going western limb and the far side.

Solar Wind / Geomagnetic Activity: Solar winds have varied slightly over the last 24 hours, between around 370km/s and just over 400km/s. Current speeds are Slightly Elevated, around 410km/s.

The interplanetary magnetic field (IMF) was weak. The important north-south component varied weakly.

Geomagnetic activity was Quiet (Kp 0-1).

Energetic Particles / Solar Radiation: Although no solar radiation storms were observed, levels are currently slightly elevated, close to the S1 (Minor Storm) threshold.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate-class flares are considered likely, with a slight chance of Strong-class flares, most likely from the sunspot region in the northeast.

Solar Wind / Geomagnetic Activity: A near-background solar wind regime is expected until the arrival of the CME from the 20 Jan. A most likely arrival time of 22/1800UTC is suggested, with G2 Likely and with a Chance of G3, continuing into the first half of Day 2 (23 Jan) before likely abating to Quiet conditions by midweek UTC. At the time of writing, a G3 Watch is valid for 22/1200-23/1200UTC.

Energetic Particles / Solar Radiation: High energy proton flux is likely to breach the S1 (Minor Storm) threshold ahead of the expected CME arrival on Day 1 (22 Jan) before waning later Day 2 (23 Jan).

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	80	50	5	1
Strong	G3	No	30	10	1	1
Severe	G4	No	5	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	60	60	15	20
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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